

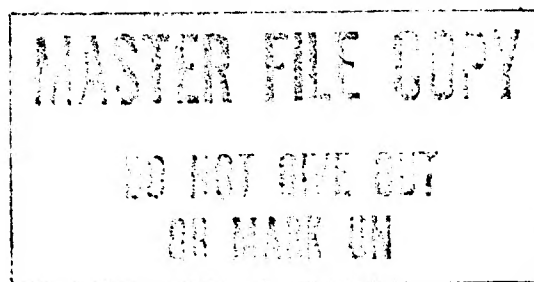


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OPEC Domestic Oil Consumption: Impact on Export Potential



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A Research Paper

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GI 83-10189
September 1983

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OPEC Domestic Oil Consumption: Impact on Export Potential

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A Research Paper

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This paper was prepared by [redacted]
[redacted] with a contribution from [redacted]
[redacted] of the Office of Global Issues.

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**OPEC Domestic Oil Consumption:
Impact on Export Potential**

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Summary

*Information available
as of 15 July 1983
was used in this report.*

Based on an analysis of recent trends in domestic oil consumption in OPEC countries and prospects for economic growth and development through 1990, we believe OPEC oil use will increase from the current level of 3.5 million b/d to about 5 million b/d in 1990. This is substantially lower than forecasts just two to three years ago that OPEC oil demand at the end of this decade would be in the 6.5- to 7-million b/d range. Even though the growth in oil consumption will be slower than previously anticipated, the 1.5 million b/d expected rise in use will cut into the amount of oil available for export. Another factor reducing export availability will be the erosion of OPEC's oil productive capacity as natural declines in the recoverability of crude oil take place in the more mature fields. Altogether, we expect OPEC's exportable oil surplus—including natural gas liquids—will approximate 27 million b/d in 1990, about 3 million b/d below present levels.

Our projection of OPEC's domestic oil demand is below earlier estimates because:

- Lower oil revenues have led to cutbacks in energy-intensive industrial development programs. These cutbacks should reduce future energy demand levels.
- Recent domestic product price increases in most countries should continue to restrain consumption growth and improve the efficiency of oil use within individual economies.
- Alternative energy sources, particularly natural gas in the electric power and industrial sectors, will be substituted for oil.

We believe the greatest uncertainty concerning future levels of OPEC oil use is the effect reduced oil revenues will have both on internal demand and on the ability of individual countries to maintain oil production at adequate levels. Financial problems will slow overall economic growth and should lead to smaller increases in future energy demand. At the same time, revenue shortfalls are likely to mean that some oil productive capacity may not be expanded, or even maintained at current levels.

By 1990 OPEC's domestic oil consumption could amount to about 15 percent of its available productive capacity. The impact of rising internal use on members, however, will be uneven. In a number of countries the combination of increased demand and a reduction in sustainable oil productive capacity will substantially reduce their ability to export oil. The major losers will be Indonesia and Nigeria. Indonesia could lose over half its current export capacity of 1.1 million b/d; at today's prices, the amount

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represents over \$5 billion annually in revenues. Nigeria faces the loss of 400,000 b/d in exports, or about \$4 billion in yearly sales. In both cases the reduced earning capability of the oil industry could pose severe financial hardships. At a minimum, it will constrain economic development potential. In the case of Saudi Arabia, the exportable surplus will shrink to about 8.6 million b/d by the end of the decade. As recently as 1980 the Saudis had an export capacity of 10.1 million b/d.

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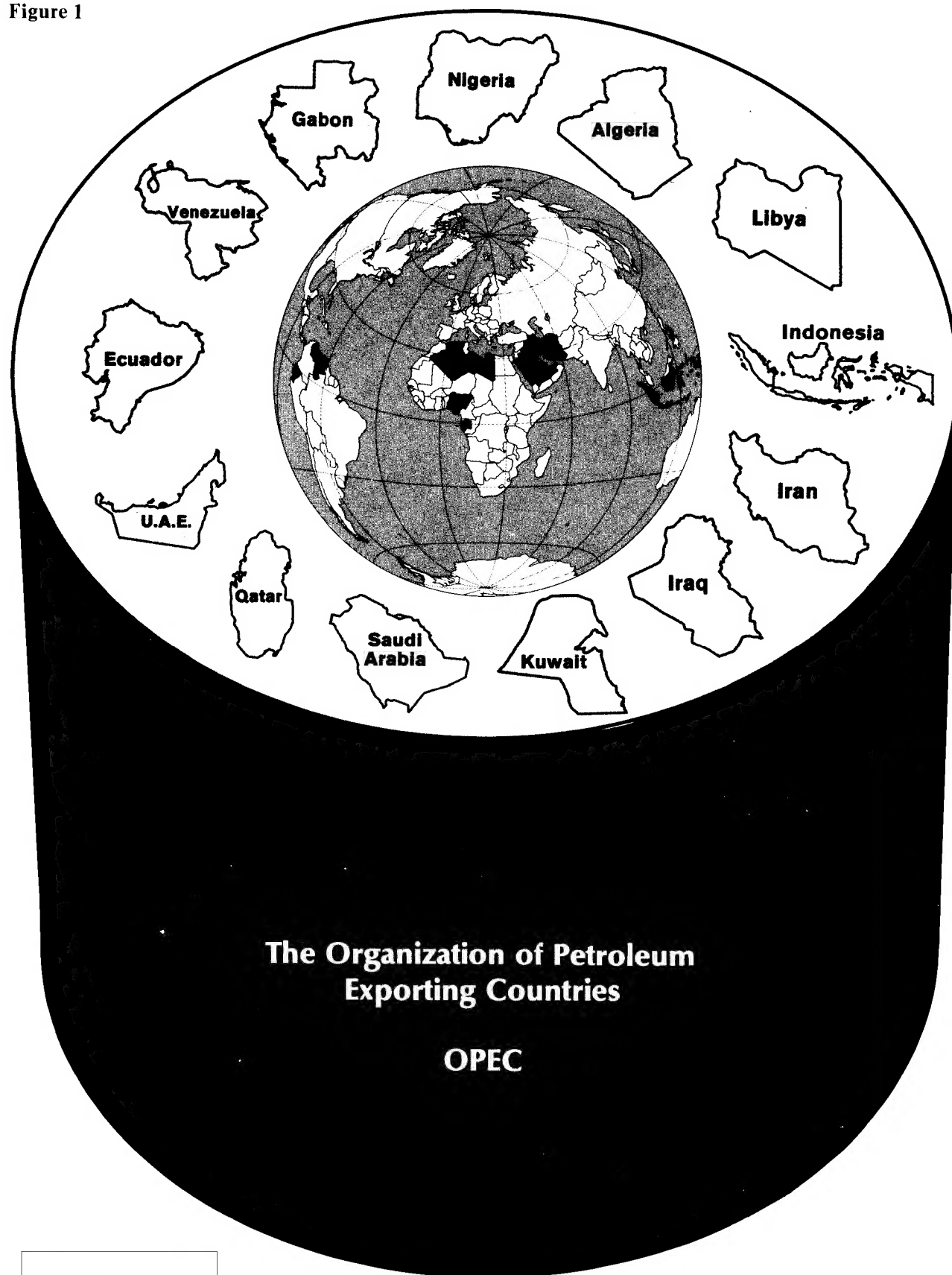
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Figure 1



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OPEC Domestic Oil Consumption: Impact on Export Potential

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Introduction

In 1979-80 many market forecasters began to focus attention on the rapid growth in OPEC's internal oil consumption and the significant impact it could have on oil availability for the West. More recently, however, the dramatic drop in oil consumption in the industrialized nations and the simultaneous increase in non-OPEC oil supplies have acted to reduce the immediacy of the problem. Still, the volume of oil consumed by OPEC members is now substantial, and our projections of expected growth in internal OPEC demand through 1990 could further reduce the oil surplus available to Western nations. OPEC consumption amounted to about 3 percent of the organization's available oil productive capacity in 1970; presently it is about 11 percent, and we believe it could reach 15 to 20 percent by 1990. Increased domestic consumption could also affect individual OPEC members unequally, potentially reducing exportable oil surpluses and badly needed revenue flows in countries such as Indonesia and Nigeria, where growing populations are putting severe pressure on government budgets.

Trends in OPEC Oil Consumption

Low levels of economic development in OPEC countries kept oil consumption almost stagnant until the early 1960s. The rapid increase in oil production from 9.4 million b/d in 1960 to 31 million b/d by 1973, however, sparked a concerted drive by OPEC members toward development and modernization. The resultant increase in economic activity led to a rise in oil consumption from 500,000 b/d in 1960, the year of OPEC's founding, to 1.6 million b/d by 1973. Between 1973 and 1982, OPEC domestic oil consumption more than doubled to 3.3 million b/d.

- Consumption in Saudi Arabia, Iran, and Iraq rose 700,000 b/d to 1.5 million b/d last year, and currently these three countries account for over 45 percent of the OPEC total.
- In six other countries—Indonesia, Nigeria, Algeria, Venezuela, Ecuador, and Gabon—consumption increased 120 percent, to more than 1.3 million b/d in 1982.

Table 1

Thousand b/d

OPEC: Projected Domestic Oil Demand ^a

	1973	1980	1982 ^b	1985 ^c	1990 ^c
Algeria	62	120	138	165	205
Ecuador	31	76	89	110	140
Gabon	9	12	14	- 17	22
Indonesia	182	405	458	560	870
Iran	425	586	530	650	860
Iraq	80	207	229	275	330
Kuwait	115	110	153	155	185
Libya	33	93	110	135	180
Nigeria	52	174	208	245	315
Qatar	3	9	12	16	22
Saudi Arabia	336	594	775	935	1,125
United Arab Emirates	5	82	110	130	155
Venezuela	271	393	425	470	570
Total OPEC ^d	1,603	2,860	3,250	3,863	4,979

^a Includes bunkers and refinery losses.

^b Estimated.

^c Projected.

^d Because of rounding, components may not add to totals shown.

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- Kuwait, the UAE, Libya, and Qatar saw demand grow 150 percent since 1973, reaching almost 400,000 b/d last year.

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Since 1979 OPEC and official country statistics show oil consumption growth rates in most OPEC countries slowing. Revolution and war significantly depressed consumption in Iran and Iraq—two members who accounted for over one-fourth of OPEC oil demand in 1980—by an estimated 200,000 b/d in 1981-82, while a general slump in economic activity because of declining oil revenues is now affecting the rest of OPEC.

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Table 2
OPEC: Oil Export Availability in 1990^a

Million b/d

	Maximum Sustainable Capacity	Domestic Consumption	Available Exports
Total	31.9	5.0	26.9
Algeria	0.6	0.2	0.4
Ecuador	0.2	0.1	0.1
Gabon	0.1	NEGL	0.1
Indonesia	1.4	0.9	0.5
Iran	3.5	0.9	2.6
Iraq	4.5	0.3	4.2
Kuwait	1.5	0.2	1.3
Libya	2.2	0.2	2.0
Neutral Zone	0.4	0.0	0.4
Nigeria	1.8	0.3	1.5
Qatar	0.5	NEGL	0.5
Saudi Arabia	9.0	1.1	7.9
UAE	2.3	0.2	2.1
Venezuela	2.2	0.6	1.6
Natural gas liquids	1.7	NEGL	1.7

^a Including natural gas liquids.

Factors Affecting Oil Consumption

Rising oil revenue has been the key factor spurring growth in OPEC domestic oil consumption, as increasing per capita income and general economic expansion raised demand for oil within member countries. Increased revenues also permitted investment in large economic and industrial development programs, many of which were energy intensive. At the same time, domestic oil prices were kept low, accelerating growth in local demand for petroleum products. Countries with large populations—Indonesia, Nigeria, and Iran, for example—found oil an inexpensive and convenient way to meet rising energy demand in all economic sectors. Although these factors will continue to underpin growth in OPEC domestic oil consumption, recent events will modify the trends in coming years:

- Lower oil revenues will slow economic expansion, lowering the rate of growth in domestic oil demand.
- A number of large development projects are being deferred or curtailed.

- Hikes in domestic oil prices are also slowing consumption growth in most OPEC countries.

Economic Growth and Development. The surge in OPEC oil revenues since 1973, which led to sustained, high rates of economic growth and extensive internal development within most of the member countries, has kept OPEC domestic oil consumption growing at a rate over 8 percent per year between 1973 and 1982. Economic data from member countries indicate that rising per capita income is increasing demand for oil in transportation, electric power generation, and residential use. Large amounts of capital have been placed into development of energy-intensive industries, further accelerating internal demand for oil as the OPEC economies expand.

Countries with large, exportable oil surpluses invested heavily in major projects, including refineries, petrochemical plants, steel mills, and other heavy industries. Saudi Arabia, Iran, and Iraq, each able to produce and export oil in excess of 3 million b/d by the late 1970s, undertook the most ambitious programs, as detailed in their official development plans. Because revenue flows until recently were very large in relation to the size of the population and domestic economy, nothing restrained the magnitude of the capital investment in these projects.

Those OPEC countries with large populations relative to their oil exports found it necessary to spread oil revenues across wider segments of the economy as spending went toward a wide variety of economic and social projects. Nonetheless, investment within these "high absorbers"—Indonesia, Nigeria, Algeria, Venezuela, Ecuador, and Gabon—has generally been channeled into programs emphasizing energy-intensive projects. Because their oil resources are generally limited, most of this group has also sought to develop other energy sources. Individual country development programs and government budgets show that oil income is being used to develop natural gas, coal, and hydroelectric resources, thereby freeing more oil for export. Government subsidies have also kept domestic

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oil prices low, however; and, as OPEC statistics indicate, rising per capita income is rapidly increasing internal demand for petroleum products. []

- Even Qatar raised domestic oil prices in May, with premium gasoline now selling for 62 cents per gallon. []

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OPEC members with small populations, large incomes, and few nonenergy natural resources—"low absorbers"—such as Kuwait, the UAE, Qatar, and Libya tended to invest in moderately sized energy-intensive industries, such as refineries and petrochemical plants. These projects generally were intended to serve export markets. Large thermal electric power and desalination plants were also constructed to serve rapidly urbanizing populations, but most of these were fueled with oil-associated natural gas that previously had been flared. Rapidly rising per capita incomes and heavily subsidized domestic oil prices kept demand for private automobiles and commercial vehicles high; and as OPEC consumption data indicate, motor fuels are accounting for a large percentage of overall oil consumption, particularly in the Middle Eastern countries. []

Based on Embassy reporting, price increases, particularly for gasoline, appear to have been successful in lowering domestic consumption rates in Indonesia, Venezuela, and Ecuador. With oil export revenues likely to remain low over the next several years, we expect more price hikes ahead for domestic fuels as governments continue to cut subsidies and budgetary outlays. As economic activity picks up in the years ahead, we believe these higher domestic price levels will tend to moderate consumption growth rates from those experienced in the past decade. []

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Domestic Pricing Policies. OPEC governments historically kept the domestic price of oil products low to spread the benefits of their oil wealth and promote economic growth. These subsidies spurred consumption of oil, which became the "preferred" energy source within most OPEC economies, as detailed in member-country statistics and International Energy Agency (IEA) studies on energy balances in the larger OPEC nations. Recently, however, decreasing demand for OPEC oil and lower oil prices have cut deeply into oil revenues, squeezing budgets and spending by many members. As a result, most governments have reduced their subsidies, and domestic oil prices within OPEC are now approaching those in importing countries, according to Embassy reporting and the trade press:

Fuel Substitution. According to OPEC Secretariat papers, development of alternative energy sources has been a goal for most members, and many have succeeded at least in harnessing their associated natural gas reserves. The tripling of oil prices in the early 1970s substantially increased the opportunity costs of flaring associated gas, and gathering networks were installed, particularly in the Middle East. Official OPEC statistics show that Kuwait, Saudi Arabia, Qatar, the UAE, Algeria, Indonesia, and Venezuela use most, if not all, of their associated gas for local industries, electric power generation, petrochemical plants, and natural gas liquid (NGL) processing centers. As long as minimum levels of oil production can be maintained, gas will replace oil as the primary fuel and feedstock in most of these systems. With limited oil reserves, Algeria has developed its large, nonassociated gasfields, backing oil out of many sectors of the economy. Similar gas reserves in countries such as Qatar, Iran, and Libya, however, are now less likely to be developed soon because of the problems of lower revenues and high capital costs. []

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- Ecuador recently scheduled petroleum product price hikes that would double the cost of most products by the end of the year, with premium gasoline now about \$1 per gallon.
- In January, Indonesia upped domestic prices for the second straight year. Kerosene, the fuel consumed in the largest amounts, rose from 32 to 54 cents per gallon, and gasoline prices jumped 67 percent to \$1.85 per gallon.

Development of other alternative energy sources, particularly hydroelectric power and coal, has been less successful in meeting rapidly increasing electricity demand. Our analysis indicates that high initial costs and lengthy construction periods put hydroelectricity at a competitive disadvantage compared with most

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oil-fired power plants. Venezuela and Iran have completed several large dams, and Embassy reporting notes that Indonesia, Nigeria, and Ecuador are in the midst of hydroelectric expansion programs.

revenue problems are now causing some delays, highlighting the vulnerability of such projects to changing market conditions. The same problems are being encountered with the development of coal resources in Indonesia and Venezuela, where exploitation is costly and time consuming. Projects in these areas are susceptible to delay or cancellation in times of tight budgets, especially if the coal is of marginal quality, as in Indonesia's case.

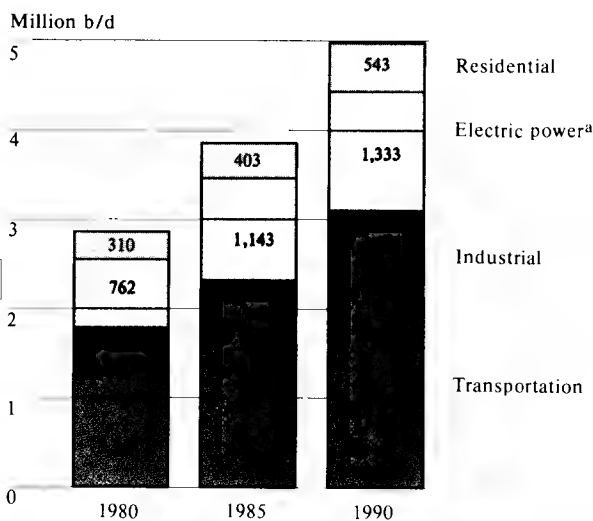
Population Growth. United Nations data project the population of OPEC countries to grow by almost 100 million people to approximately 430 million by 1990, a 2.6-percent average annual increase for the decade. Indonesia, Nigeria, and Iran will add 69 million people—roughly 70 percent of the overall OPEC increase. This growth comes at a time when traditional noncommercial energy sources for heating and cooking—primarily wood and charcoal—are becoming harder to find. Government development plans in these countries call for rural electrification programs to meet much of the additional residential demand, but any construction delays in the electric power projects will cause greater demand for kerosene as the only alternative suitable for residential-sector use.

Oil Demand Through 1990

Based on the most recent complete data available on domestic consumption, we have estimated oil consumption through 1990 for each OPEC member by both sector and fuel type, and by fuel type within sectors. Because of data limitations, 1980 is the most complete base year for estimates of future sectoral consumption. We have also attempted to account for the effects of shifts in fuel use arising from various members' economic development and alternative energy programs.

Sectoral Oil Use. We expect the largest increase in oil consumption to occur in the *transportation sector*. Our projections show consumption of gasoline and motor diesel fuels increasing from 1.2 million b/d in 1980 to over 2.1 million b/d in 1990 as the total number of road vehicles more than doubles from

Figure 2
OPEC Domestic Oil Consumption:
Demand by Sector



^a Including desalination plants.

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9 million in 1980. Still, increases in motor fuel use should slow sharply in this decade from the 15- to 18-percent annual growth rate of the 1970s. In most countries, rising gasoline prices should contribute to lower consumption; and, as a result of turnover in the vehicle fleet, increased per capita travel in private vehicles should be offset by increasing vehicle efficiency.

In our judgment, bunker fuel use, which has declined sharply since 1973 with the cutback in OPEC oil exports, should rebound to almost 240,000 b/d by 1990. Growing bunker consumption for commodity import shipments to OPEC countries will account for most of the increase. Increased jet travel, particularly in countries such as Saudi Arabia, Indonesia, and Venezuela, will consume a larger proportion of kerosene, although total amounts used will remain relatively small, under 190,000 b/d.

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OPEC: Sectoral Oil Demand

OPEC statistics and official data from member countries indicate that, within sectors of the economy, transportation has accounted for the largest increase in oil use as the number of vehicles rose from 3.6 million in 1973 to over 9 million in 1980. The urban movement—UN data indicate OPEC's urban population grew two-and-one-half times to 105 million people between 1960 and 1980—and industrialization caused a large increase in demand for electricity, boosting oil needs for power generation to 760,000 b/d by 1980. Residential kerosene use also rose rapidly in the more heavily populated countries as low prices and readily available supplies encouraged the switch from more traditional fuels such as wood and charcoal. In Indonesia and Iran residential kerosene use more than doubled over the 1970s, rising to about 225,000 b/d by 1980. Consumption of bunker fuels by oil tankers also soared, peaking in 1973 when bunkers accounted for almost one-third of total OPEC oil consumption of 1.6 million b/d. Bunker fuel consumption amounted to about 210,000 b/d in 1980. []

Consumption of liquid fuels in the electric power sector will grow by almost 600,000 b/d over the decade to 1.3 million b/d by 1990, primarily because of expansion of the electric power network in Saudi Arabia and, to a lesser extent, Iran. The Saudis will account for over one-half the increase as large power and desalination plants are constructed in the western section of the country, where natural gas will not be available as an alternative fuel. Approximately 90,000 b/d of the increase will come in Iran, where we believe delays in substituting natural gas in the power sector will force Tehran to turn to oil as an alternative fuel at least through 1990. We believe aggressive programs by the remainder of the OPEC members to expand their power sectors in the 1970s using alternative fuels—particularly natural gas—will result in only minimal growth in demand for oil through 1990, amounting to slightly over 4 percent per year. Total OPEC electric generating capacity should reach 85 gigawatts¹ by 1990, 80 percent above the 1980 level. The proportion of nonoil units should surpass oil-fueled plants after 1985 as natural gas and hydroelectricity play a larger role. []

¹ A gigawatt is 10⁹ watts, or 1,000 megawatts (MW). []

Description of Fuel Types

Gasoline. A refined petroleum distillate suitable for use as a fuel in spark-ignition internal combustion engines. []

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Kerosene. A refined petroleum distillate used primarily for lighting and heating, and as a fuel for certain types of internal combustion engines. Aviation kerosene or jet fuel is also included in this category. []

Distillates. A general term covering oils such as diesel fuel or gasoil, which are suitable for use in diesel or other compression ignition engines, or as a burner fuel in certain heating installations, such as residential or apartment buildings. []

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Residual Fuel Oil. A general term applied to an oil used for production of power or heat, usually under boilers or in industrial furnaces; most residual fuel oils are also found to contain a small percentage of sulfur, which differentiates residual fuel oil from the lighter distillate fuels. []

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Other Fuels. This category includes petroleum products that are primarily used in nonenergy processes, such as feedstocks for petrochemical production, machinery lubricants, and asphalt for highways; it also includes crude oil when used in oilfield operations or in electric power generation. []

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Bunkers. Any fuel oil or diesel fuel used to power ships. []

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Refinery Losses. Oil lost in the process of refining crude oil into petroleum products; this category also includes crude oil or products used as fuel in the refining process. []

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Data Sources. Official country statistics and Embassy reporting were supplemented with data from OPEC, the Organization of Arab Petroleum Exporting Countries (OAPEC), International Energy Agency (IEA), and United Nations and World Bank energy statistics. Department of Energy data were generally used for bunker sales and refinery fuel and losses. Data include petroleum-sector consumption normally excluded from most domestic consumption figures. []

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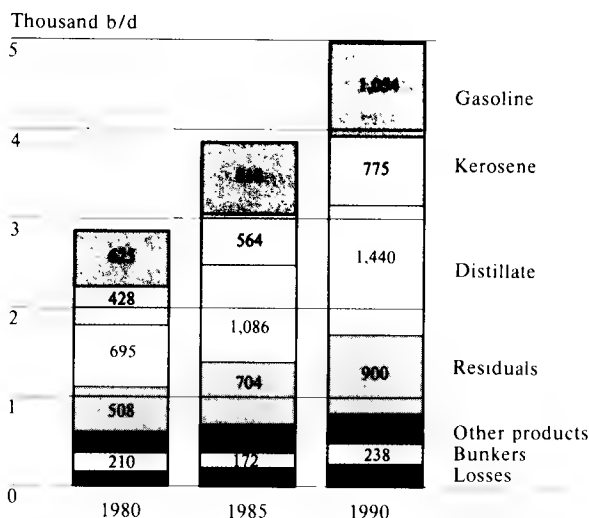
Two of the most populous OPEC countries—Iran and Indonesia—make direct use of extensive quantities of oil in the *residential sector*. Government statistics show that kerosene is used primarily for cooking in Indonesia and for heating in Iran. Iran is also the only OPEC country to use significant amounts of distillate fuels for home heating. Rapid population growth, the shift from wood and charcoal, and low fuel prices will encourage growth in kerosene consumption in these two countries through the mid-1980s until substitutes become more widely available. We project total residential demand to grow by about 75 percent over the decade, to about 545,000 b/d in 1990. Most other OPEC countries already rely more heavily on liquefied petroleum gas (LPG), natural gas, and electricity for residential purposes.

OPEC's oil-processing and refining sectors account for more than half of the *industrial sector's* oil consumption. Most consumption occurs in oilfield operations and from refinery losses, shrinkage, and spillage. Although conversion to natural gas and modernization of existing and new refineries should slow the growth in the petroleum industry's oil consumption, we believe a planned doubling of refinery capacity by 1990 will still boost industrial use of oil for refining. Cement and steel operations will account for most of the remaining industrial use. Other non-energy industrial uses of oil products—road construction, petrochemicals, and lubrication—account for the remainder of OPEC oil consumption, and we expect growth to increase at about the same rate as in the recent past. Natural gas, however, will substantially replace oil use in the petrochemical sector.²

Product Use. Our projection of fuel use by product type indicates that *distillate* fuel consumption will grow most rapidly between 1980 and 1990, rising from 700,000 b/d to over 1.4 million b/d. As a share of total consumption, distillate fuels will increase from 24 to 29 percent because of expanded use in both the transportation and electric power sectors. *Bunker fuel* use as a percentage of total oil consumption will show the largest decrease, dropping from a 7-percent share in 1980 to about 5 percent in 1990. In our view, shares

² For the purpose of this study, we have also placed into the industrial sector all oil consumption listed in official statistics under an "other" category, unless estimates of miscellaneous oil product use were available for the other four sectors.

Figure 3
OPEC: Projected Product Demand



of total consumption of most other fuel types, including *gasoline*, *kerosene*, and *residual fuel oil*, will remain about the same over the decade. Despite the expansion of OPEC's refining capacity in coming years, newer technology will keep *refinery losses* at about 5 percent of total consumption throughout the decade.

Outlook and Implications

The major uncertainty affecting growth in OPEC domestic oil consumption throughout the 1980s is the impact of reduced oil revenues on economic growth within member countries and investment in alternative energy programs. Loss of oil revenues has already caused postponement of some phases of energy substitution programs in certain OPEC countries, although the near-term impact of most of these actions should

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Other Forecasts

Our oil consumption projection is generally in line with most other recently published forecasts, all of which are more pessimistic in their estimates of growth in OPEC oil demand than studies published by various organizations a few years earlier. The 1980 OPEC Secretariat report, for example, placed 1990 internal consumption at 6.3 million b/d excluding bunkers and losses. Most other estimates completed in 1980 [] projected OPEC consumption in 1990 below 5.5 million b/d. Four studies that have become available within the past year, however, now forecast demand ranging from 4.3 to 5.3 million b/d, including bunkers and losses.

[] In general they expect the greatest growth in consumption to occur in the transportation sector with distillate fuel accounting for the largest increase in product demand.

be minimal. Later in the decade, however, the non-availability of suitable alternative fuels could force other countries into consuming greater quantities of oil than we currently expect:

- Tighter budgets may delay expansion of Saudi Arabia's master gas system, reducing gas availability for industry later in the decade when Saudi crude oil output returns to levels in the range of 7-8 million b/d; we estimate that the current gas shortfall caused by low levels of oil output is forcing the Saudis to burn an additional 70,000 b/d of liquid fuels for local energy needs.
- Algerian delays in developing new gasfields will reduce volumes available to meet export contracts after 1985, a problem Algiers may have to solve by slowing the substitution of gas for oil throughout the economy.
- [] Iran has revived dormant plans to develop its natural gas reserves for oilfield reinjection and increased domestic consumption, but technical problems and lack of financing could cause delays. []

[] the revenue crisis facing most OPEC countries is causing reduced government spending, sluggish economic activity, and less capital investment, especially in the petroleum sector. Spending on projects designed to maintain or expand oilfield productive capacity is being curtailed. Over the longer run this could hasten the decline in oil output from OPEC's more mature producing fields:

- Saudi Arabia is delaying until the late 1980s plans to develop medium and heavy oilfields offshore in the Persian Gulf.
- Venezuela has canceled plans to exploit heavy-oil deposits in the Orinoco River basin, effectively postponing to the 1990s any large-scale production from this area.
- A weak market and lower revenues have caused participating oil companies in Nigeria and Indonesia to back off ambitious exploration and development drilling campaigns.

Without the investment needed to offset capacity erosion in older fields, some OPEC members will be hard pressed to maintain adequate levels of oil exports and revenues by the end of the 1980s. []

In 1977 OPEC oil exports peaked at 29.9 million b/d. We estimate that OPEC currently could export a maximum of about 30 million b/d, including almost 3 million b/d of productive capacity now shut in in Iraq. By 1990 the surplus available for export will have dropped below 27 million b/d, potentially costing OPEC over \$30 billion annually in oil revenues at the current benchmark price of \$29 per barrel. In addition, today's soft oil market could cause further complications for members forced to curtail investment in alternative energy programs. Their failure to provide substitutes could eventually lead to higher-than-anticipated growth in domestic oil consumption in the post-1985 period, further reducing OPEC's export potential while adding to the financial pressures already facing some members. []

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Table 3
OPEC: Leading Indicators
of Oil Product Use

Indicator	1973	1980	1985	1990
Vehicles (<i>million</i>)	3.6	9.2	17	25
Electric capacity (<i>GW</i>)	14	47	73	85
Oil fired	10	26	36	40
Nonoil fired	4	21	37	45
Population (<i>million</i>)	281	335	380	430
Refinery capacity (<i>1,000 b/d</i>)	4,152	5,500	8,600	9,712-10,915
Oil export availability ^a (<i>million b/d</i>)	29.5	25.0	29.9	26.9

^a Actual exports for 1973 and 1980, including natural gas liquids. Export capacities for 1985 and 1990 are based on estimates of production capacity less domestic consumption and include natural gas liquids.

While Saudi Arabia is not likely to face financial problems as acute as those discussed above, we believe export capacity will erode from the 1980 peak of 10.1 million b/d to an estimated 8.6 million b/d in 1990—including one-half of the Neutral Zone production and about 500,000 b/d in NGL. The loss—representing over \$15 billion in yearly earnings at current prices—is also the bulk of OPEC excess oil productive capacity that would not be available later in the decade should the West be faced with another oil supply disruption.

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The problem could be particularly acute for a number of OPEC countries:

- *Indonesia*, a nation which obtains over 70 percent of its export earnings from oil, faces a drop in its oil export potential from the current 1.1 million b/d to possibly less than half that in 1990, a potential revenue loss of over \$5 billion annually at today's oil prices.
- Over 95 percent of *Nigeria's* export earnings come from oil, and Lagos can ill afford a possible 400,000-b/d decrease in export capability by 1990, an amount worth over \$4 billion a year.
- *Ecuador*, OPEC's smallest exporter, still obtains about 60 percent of its export earnings from oil, and we estimate that its exportable surplus at the end of the decade will be about one-half the current 120,000 b/d, with potential for revenue losses as high as \$600 million annually.

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Appendix

Fuel Consumption, by Country

OPEC

Thousand b/d

Total Domestic Oil Consumption, by Fuel Type

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	241.6	273.2	328.9	383.0	451.6	510.4	555.3	624.6	650.1	694.4	726.9	818.0	1,054.0
Kerosene	198.4	232.4	252.9	301.0	345.3	365.8	400.0	427.6	443.1	467.9	498.5	564.0	775.0
Distillate	250.1	279.3	345.9	415.6	512.4	581.8	639.0	694.7	801.3	884.0	974.9	1,086.0	1,440.0
Residual	189.7	203.5	238.2	274.8	290.4	350.4	377.6	508.0	565.0	624.3	654.2	704.0	900.0
Other	82.3	84.4	98.8	119.3	151.1	182.7	192.6	234.1	244.1	282.6	307.8	315.0	327.0
Bunkers	530.5	487.7	324.0	327.1	331.5	282.8	279.9	210.1	142.1	136.0	124.9	172.0	238.0
Losses	110.6	121.5	118.4	139.0	131.3	142.0	142.8	161.2	141.0	161.3	173.5	204.0	245.0
Total	1,603.2	1,682.0	1,707.1	1,959.8	2,213.6	2,415.9	2,587.2	2,860.3	2,986.7	3,250.5	3,460.7	3,863.0	4,979.0

^a Estimated.^b Projected.

25X1

OPEC

Thousand b/d

Sectoral Oil Demand, by Fuel Type and Year ^a

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	625	90	293	214	8	0	1,230
Electric	0	10	305	383	64	0	762
Industrial	0	28	87	121	162	161	559
Residential	0	300	10	0	0	0	310
Total	625	428	695	718	234	161	2,860
1985							
Transport	818	126	431	202	10	0	1,587
Electric	0	10	500	543	90	0	1,143
Industrial	0	40	140	131	215	204	730
Residential	0	388	15	0	0	0	403
Total	818	564	1,086	876	315	204	3,863
1990							
Transport	1,054	187	586	278	15	0	2,120
Electric	0	5	584	694	50	0	1,333
Industrial	0	60	250	166	262	245	983
Residential	0	523	20	0	0	0	543
Total	1,054	775	1,440	1,138	327	245	4,979

^a Because of rounding, components may not add to totals shown.

25X1

OPEC: Economic Profile, 1982

	Algeria	Ecuador	Gabon	Indonesia	Iran	Iraq	Kuwait	Libya	Nigeria	Qatar	Saudi Arabia	United Arab Emirates	Venezuela
Aggregate data													
Population													
Million persons at midyear	20.1	8.5	0.7	157.6	41.2	14.0	1.6	3.3	82.4	0.3	9.8	1.2	17.4
Percent increase	3.2	3.1	1.3	2.1	3.1	3.3	6.2	4.9	3.3	4.0	2.8	11.3	3.3
Gross national product (billion 1982 US \$)	42.5	12.0	5.3	93.7	69.7	27.1	23.7	17.8	57.4	7.2	132.7	25.8	72.5
Percent real growth ^a	5.0	2.0	5.0	6.5	-2.5	-2.1	3.0	-3.9	-11.0	3.0	5.2	10.0	-2.0
Per capita (1982 US \$)	2,120	1,410	7,570	590	1,690	1,940	14,800	5,390	700	24,000	13,540	21,500	4,170
Oil industry													
Crude oil production (thousand b/d)	701	211	148	1,314	2,282	972	822 ^b	1,183	1,298	328	6,486 ^b	1,248	1,893
Average crude oil production, 1978-82 (thousand b/d)	968	208	177	1,544	2,747	2,104	1,648 ^b	1,645	1,800	440	8,807 ^b	1,622	2,138
Peak production (thousand b/d)	1,161	214	223	1,685	6,022	3,477	2,497 ^b	3,318	2,302	570	9,903 ^b	1,998	3,708
Year	1978	1979	1975	1977	1974	1979	1979	1970	1979	1973	1980	1977	1970
Refinery capacity (thousand b/d)	436	79	20	341	530	220	623	130	260	12	875	135	1,284
Transportation sector													
Vehicles (thousand units)	747	215	36	1,195	1,425	260	535	568	850	61	1,385	530	1,933
Highways (thousand kilometers)	78.4	69.3	6.9	93.1	85.0	20.8	2.5	19.3	108.0	0.8 ^c	30.1	0.8 ^c	77.8
Other													
Electricity generating capacity (thousand megawatts)	2.9	1.2	0.2	5.1	10.9	4.8	3.4	2.8	2.2	1.2	15.1	4.0	12.7

^a Growth in GDP.^b Including about one-half of Neutral Zone production.^c Excluding earth tracks, the mileage of which is undetermined.

OPEC—Domestic Oil Consumption by Country

Thousand b/d

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Algeria	61.7	60.9	70.1	82.9	93.9	95.2	115.6	120.1	127.3	137.6	145.0	165.0	205.0
Ecuador	31.1	32.6	38.5	43.9	50.6	61.9	71.9	75.7	81.6	89.2	97.0	110.0	140.0
Gabon	8.8	9.4	9.9	11.8	14.9	14.5	10.3	11.8	13.3	14.3	14.7	17.0	22.0
Indonesia	182.1	213.7	224.2	249.0	296.9	346.0	367.1	405.1	447.6	458.4	475.0	560.0	870.0
Iran	425.2	447.2	472.0	531.3	589.2	590.7	566.8	586.0	488.1	530.0	572.0	650.0	860.0
Iraq	80.4	90.5	103.6	121.2	137.8	162.4	185.2	207.2	211.6	228.5	246.0	275.0	330.0
Kuwait	115.1	89.8	93.8	102.0	102.7	110.1	125.3	109.6	127.1	152.9	169.0	155.0	185.0
Libya	32.8	37.4	51.4	56.2	66.6	74.3	87.3	93.4	101.2	109.7	118.0	135.0	180.0
Nigeria	51.5	56.3	68.8	90.7	113.3	135.8	156.3	173.6	200.1	208.1	217.0	245.0	315.0
Qatar	2.8	3.3	4.5	5.8	8.1	8.0	8.7	9.4	10.6	11.9	12.0	16.0	22.0
Saudi Arabia	335.6	362.4	285.6	354.2	401.7	439.3	483.9	593.7	668.0	774.9	844.0	935.0	1,125.0
UAE	4.8	7.1	25.6	31.7	47.9	55.9	58.3	81.9	102.3	109.8	118.0	130.0	155.0
Venezuela	271.3	271.4	259.1	279.1	290.0	321.8	350.5	392.8	407.9	425.2	433.0	470.0	570.0
OPEC total	1,603.2	1,682.0	1,707.1	1,959.8	2,213.6	2,415.9	2,587.2	2,860.3	2,986.7	3,250.5	3,460.7	3,863.0	4,979.0

^a Estimated.^b Projected.

Algeria
Domestic Oil Consumption, by Fuel Type

Thousand b/d

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	13.1	14.1	15.2	16.6	21.1	22.3	25.0	28.1	30.4	32.0	34.0	35.0	50.0
Kerosene	5.3	5.1	6.3	6.3	7.2	5.7	9.0	7.3	7.6	8.4	9.0	10.0	15.0
Distillate	15.6	21.5	28.2	31.1	35.8	35.6	39.7	39.0	42.2	47.6	50.0	55.0	75.0
Residual	15.5	7.4	7.1	11.1	10.0	8.5	6.0	6.0	4.5	4.0	4.0	5.0	5.0
Other	7.4	9.8	10.6	15.4	17.3	17.6	25.9	28.7	31.1	33.6	35.0	40.0	40.0
Bunkers	1.3	0.0	0.0	0.0	0.0	2.7	3.0	2.0	2.5	3.0	3.0	5.0	5.0
Losses	3.5	3.0	2.7	2.4	2.5	2.8	7.0	9.0	9.0	9.0	10.0	15.0	15.0
Total	61.7	60.9	70.1	82.9	93.9	95.2	115.6	120.1	127.3	137.6	145.0	165.0	205.0

^a Estimated.

^b Projected.

25X1

Algeria
Sectoral Oil Demand, by Fuel Type and Year

Thousand b/d

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	28	5	34	2	0	0	69
Electric	0	0	5	2	3	0	10
Industrial	0	0	0	4	26	9	39
Residential	0	2	0	0	0	0	2
Total	28	7	39	8	29	9	120
1985							
Transport	35	5	50	5	0	0	95
Electric	0	0	5	0	5	0	10
Industrial	0	0	0	5	35	15	55
Residential	0	5	0	0	0	0	5
Total	35	10	55	10	40	15	165
1990							
Transport	50	10	65	5	0	0	130
Electric	0	0	5	0	5	0	10
Industrial	0	0	5	5	35	15	60
Residential	0	5	0	0	0	0	5
Total	50	15	75	10	40	15	205

25X1

Confidential

Confidential

Algeria

Algeria's consumption of refined products grew by 9 percent annually between 1973 and 1982, reaching almost 140,000 b/d last year. An ambitious gas substitution program will probably slow growth over the decade to an annual rate of about 5 percent, with oil consumption reaching 205,000 b/d by 1990. At that time, we expect natural gas to be supplying over one-half the total energy needs of the country.

Transportation Sector

Transportation currently accounts for about 60 percent of oil consumption. Limited port capacity and slower domestic economic growth, however, should slow the growth rate of the vehicle fleet for the remainder of the decade. As a result, we believe oil demand in the sector will increase from the present 80,000 b/d to about 130,000 b/d in 1990, or about 7-percent annual growth.

Electric Power Sector

Over the past several years, natural gas has been displacing residual fuel oil and coal for electric power generation in Algeria and currently accounts for 90 percent of electric power fuel requirements. We estimate that only 10,000 b/d of residual and diesel oil is currently used for electric power—mainly for small plants and diesel generators in remote locations. Although Algerian officials have stated plans to double electric power capacity between 1980 and 1985 and again between 1985 and 1990, most of the new plants will be fueled by natural gas. If electricity demand exceeds supply, however, temporary increases in the use of diesel fuels for power generation could occur.

Industrial Sector

Since 1970 more than one-half of Algeria's industrial base has converted to natural gas, with bottled gas accounting for much of the remainder. Industry sources also indicate the Algerians are making a concerted drive to switch their remaining manufacturing plants, along with new steel and industrial projects, to gas. An estimated 45,000 b/d of oil is currently consumed by industry.

25X1
25X1**Residential/Commercial Sector**

Bottled gas and electricity are used extensively in the residential and commercial sectors, reducing current residential demand for kerosene to around 3,000 b/d. We expect residential natural gas use will increase as Algiers expands the distribution network, dropping kerosene consumption even further.

25X1
25X1

25X1

Confidential

Confidential

Ecuador

Thousand b/d

Domestic Oil Consumption, by Fuel Type

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	11.3	13.0	15.7	18.1	20.5	23.1	26.1	29.0	29.5	31.9	34.0	40.0	45.0
Kerosene	3.6	4.1	5.1	6.6	7.0	8.0	11.0	7.5	8.4	9.1	10.0	10.0	15.0
Distillate	6.9	7.8	8.8	9.7	11.9	12.8	16.0	16.8	19.0	20.5	23.0	30.0	35.0
Residual	6.1	6.8	8.4	8.7	9.2	11.6	12.0	15.5	20.3	23.7	26.0	30.0	40.0
Other	1.4	0.5	0.4	0.4	1.7	0.8	3.0	1.9	2.0	2.2	2.0	0.0	5.0
Bunkers	0.0	0.0	0.0	0.0	0.0	2.8	1.8	2.0	1.5	0.8	1.0	0.0	0.0
Losses	1.8	0.4	0.1	0.4	0.3	2.8	2.0	3.0	0.9	1.0	1.0	0.0	0.0
Total	31.1	32.6	38.5	43.9	50.6	61.9	71.9	75.7	81.6	89.2	97.0	110.0	140.0

^a Estimated.^b Projected.

25X1

Ecuador

Thousand b/d

Sectoral Oil Demand, by Fuel Type and Year

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	29	2	5	2	0	0	38
Electric	0	0	12	8	0	0	20
Industrial	0	0	0	7	2	3	12
Residential	0	6	0	0	0	0	6
Total	29	8	17	17	2	3	76
1985							
Transport	40	5	10	0	0	0	55
Electric	0	0	20	20	0	0	40
Industrial	0	0	0	10	0	0	10
Residential	0	5	0	0	0	0	5
Total	40	10	30	30	0	0	110
1990							
Transport	45	5	15	0	0	0	65
Electric	0	0	20	25	0	0	45
Industrial	0	0	0	15	5	0	20
Residential	0	10	0	0	0	0	10
Total	45	15	35	40	5	0	140

25X1

Confidential

Confidential**Ecuador**

Ecuador's official statistics show petroleum consumption growing at an annual rate of about 12 percent between 1973 and 1982. We believe consumption growth rates will decline during the current decade—averaging perhaps 6 percent annually—as eroding petroleum export revenues force Quito to shelve energy-intensive development projects and boost domestic energy prices. Petroleum product prices have been raised several times over the last year, and premium gasoline is now about \$1 per gallon. A currency devaluation now in progress, in addition to a further slowing in domestic economic activity, should also reduce the importation of vehicles in the years ahead, slowing growth in oil demand in the transportation sector. Consumption of oil for electricity generation should increase only marginally in the late 1980s as a number of new hydroelectric projects come on line. After 1990 Quito's development plans call for new electric power generating capacity to be fueled by natural gas.

25X1

Confidential

Confidential

Gabon

Thousand b/d

Domestic Oil Consumption, by Fuel Type

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	0.8	0.5	0.5	0.5	0.5	0.5	0.4	0.9	1.0	1.0	0.9	2.0	2.0
Kerosene	0.6	0.6	0.6	0.6	0.6	0.6	0.4	0.4	0.4	0.5	0.5	1.0	1.0
Distillate	2.6	2.5	2.3	2.5	5.0	5.9	3.1	3.6	4.1	4.7	4.9	6.0	9.0
Residual	2.7	3.2	3.8	4.0	4.9	4.2	3.2	3.5	4.0	4.1	4.2	4.0	5.0
Other	0.2	0.3	0.0	0.3	0.5	0.3	0.2	0.3	0.3	0.3	0.3	0.0	1.0
Bunkers	1.4	1.3	1.1	1.2	1.3	1.5	1.5	1.6	2.0	1.8	1.9	2.0	2.0
Losses	0.5	1.0	1.6	2.7	2.1	1.5	1.5	1.5	1.5	1.9	2.0	2.0	2.0
Total	8.8	9.4	9.9	11.8	14.9	14.5	10.3	11.8	13.3	14.3	14.7	17.0	22.0

^a Estimated.^b Projected.

25X1

Gabon

Thousand b/d

Sectoral Oil Demand, by Fuel Type and Year

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	1	0	2	2	0	0	5
Electric	0	0	2	3	0	0	5
Industrial	0	0	0	1	0	1	2
Residential	0	0	0	0	0	0	0
Total	1	0	4	6	0	1	12
1985							
Transport	2	0	3	2	0	0	7
Electric	0	0	3	3	0	0	6
Industrial	0	0	0	1	0	2	3
Residential	0	1	0	0	0	0	1
Total	2	1	6	6	0	2	17
1990							
Transport	2	0	7	2	0	0	11
Electric	0	0	2	4	0	0	6
Industrial	0	0	0	1	1	2	4
Residential	0	1	0	0	0	0	1
Total	2	1	9	7	1	2	22

25X1

Confidential

Confidential**Gabon**

According to United Nations statistics, domestic oil consumption in Gabon peaked at 15,000 b/d in 1977, falling by a third thereafter as the country was forced in 1978-79 to undergo a period of economic austerity by the International Monetary Fund. Oil demand is only now regaining 1977 levels, with growth centered on the transportation sector, which historically has accounted for about half of domestic oil demand since 1973. We expect this trend to continue as use of diesel fuel increases in Gabon's expanding railway system. Increased availability of hydroelectricity should keep demand for other products at relatively low rates of growth for the remainder of the decade.

25X1

Confidential

Confidential**Indonesia***Thousand b/d***Domestic Oil Consumption, by Fuel Type**

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	32.9	36.8	41.3	44.0	49.9	56.0	60.4	65.3	71.6	73.0	75.0	85.0	120.0
Kerosene	68.1	81.2	83.9	92.1	107.1	121.2	132.1	142.7	154.1	158.7	165.0	195.0	310.0
Distillate	41.1	50.7	61.5	74.0	89.9	104.9	114.4	130.3	147.8	152.1	157.0	185.0	295.0
Residual	18.0	18.7	18.7	19.4	21.9	25.9	32.6	40.5	46.5	48.2	51.0	60.0	100.0
Other	2.3	2.5	4.6	4.7	2.7	20.0	9.2	8.0	8.0	8.4	9.0	10.0	15.0
Bunkers	7.7	6.3	7.7	8.2	10.3	10.1	10.4	10.3	10.5	9.0	9.0	10.0	10.0
Losses	12.0	17.5	6.5	6.6	15.1	7.9	8.0	8.0	9.1	9.0	9.0	15.0	20.0
Total	182.1	213.7	224.2	249.0	296.9	346.0	367.1	405.1	447.6	458.4	475.0	560.0	870.0

^a Estimated.^b Projected.

25X1

Indonesia*Thousand b/d***Sectoral Oil Demand, by Fuel Type and Year**

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	65	9	46	21	1	0	142
Electric	0	0	13	13	0	0	26
Industrial	0	28	71	17	7	8	131
Residential	0	106	0	0	0	0	106
Total	65	143	130	51	8	8	405
1985							
Transport	85	15	65	35	0	0	200
Electric	0	0	20	15	0	0	35
Industrial	0	40	100	20	10	15	185
Residential	0	140	0	0	0	0	140
Total	85	195	185	70	10	15	560
1990							
Transport	120	20	105	50	0	0	295
Electric	0	0	25	25	0	0	50
Industrial	0	60	165	35	15	20	295
Residential	0	230	0	0	0	0	230
Total	120	310	295	110	15	20	870

25X1

Confidential

Confidential

Indonesia

We project Indonesia will consume about 870,000 b/d of oil by 1990, 80 percent above current levels. Recent slow growth in oil consumption due to increases in domestic oil prices and the generally sluggish economy are unlikely to last after 1984, when pent-up demand from a growing population and increasing economic activity should push oil consumption growth rates back toward 10 percent annually. If Jakarta plans to maintain a sizable oil export capability into the 1990s, substantial hikes in domestic oil prices could be necessary. [REDACTED]

Transportation Sector

According to Indonesian statistics, the transportation sector currently accounts for over one-third of total oil consumption. Domestic price increases for gasoline in early 1982 appear to have dropped growth in demand to less than 4 percent over the past year, and another round of price increases this year should continue to keep consumption growth low through 1984. Strong popular demand for motor transport, however, will continue the shift to private motor vehicles and public transportation. In a nation of approximately 13,000 islands, interisland air and sea movements will consume increasing amounts of oil products, and we expect demand in this area to more than double, from 30,000 b/d in 1980 to 70,000 b/d by 1990. [REDACTED]

Industrial Sector

Our projections show industrial-sector oil consumption to grow from the current 160,000 to 165,000 b/d to almost 300,000 b/d by 1990. Government subsidies, which kept kerosene prices low for household use, resulted in widespread industrial substitution of kerosene for other fuel oils, and the sector could be consuming over 60,000 b/d of kerosene by 1990. Nonenergy use of oil products—asphalts and lubricants—will increase only slightly, particularly as natural gas is substituted for oil as an industrial feedstock in the petrochemical industry. [REDACTED]

Residential Sector

Residential consumption of oil is also expected to remain at about one-fourth of total oil demand throughout the decade. Growth in household use of kerosene—which Indonesian statistics show ran at around 11 percent annually from 1973 to 1980—slumped sharply to about 3 percent last year due to price increases that raised the cost of domestic kerosene from 23 to 54 cents per gallon. We expect residential demand for kerosene to accelerate in the last half of the decade, as delays in construction of additional electric capacity force households shifting from noncommercial energy sources, such as wood, to use kerosene. [REDACTED]

Electric Power Sector

Although most of Indonesia's installed electric generating capacity is fueled by oil, the total consumed is only about 30,000 b/d. Probable delays in Indonesian plans to construct coal and hydroelectric power plants will keep the use of oil-fired thermal plants high. As a result, we project oil consumption in the sector to increase to about 50,000 b/d between now and 1990. [REDACTED]

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Confidential

Confidential

Iran

Thousand b/d

Domestic Oil Consumption, by Fuel Type

	1973	1974	1975	1976	1977	1978	1979	1980 ^a	1981 ^a	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	33.2	40.2	54.0	63.7	81.0	92.0	92.0	100.0	69.5	75.0	83.0	100.0	130.0
Kerosene	66.9	77.7	78.5	106.9	123.6	124.1	128.0	130.0	120.4	130.0	143.0	160.0	205.0
Distillate	77.9	87.3	105.9	124.0	149.6	136.0	151.0	165.0	152.8	165.0	170.0	190.0	260.0
Residual	69.1	76.3	88.6	99.2	107.4	126.0	102.0	105.0	97.2	105.0	115.0	125.0	160.0
Other	11.9	14.1	17.1	16.5	26.1	21.6	21.0	21.0	23.2	25.0	26.0	30.0	40.0
Bunkers	128.3	116.5	98.0	75.0	70.0	61.0	46.9	30.0	5.0	10.0	15.0	25.0	35.0
Losses	37.9	35.1	29.9	46.0	31.5	30.0	25.9	35.0	20.0	20.0	20.0	20.0	30.0
Total	425.2	447.2	472.0	531.3	589.2	590.7	566.8	586.0	488.1	530.0	572.0	650.0	860.0

^a Estimated.^b Projected.

25X1

Iran

Thousand b/d

Sectoral Oil Demand, by Fuel Type and Year

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	100	12	45	30	2	0	189
Electric	0	0	110	101	0	0	211
Industrial	0	0	0	4	19	35	58
Residential	0	118	10	0	0	0	128
Total	100	130	165	135	21	35	586
1985							
Transport	100	15	60	25	0	0	200
Electric	0	0	115	115	0	0	230
Industrial	0	0	0	10	30	20	60
Residential	0	145	15	0	0	0	160
Total	100	160	190	150	30	20	650
1990							
Transport	130	25	75	35	5	0	270
Electric	0	0	160	140	0	0	300
Industrial	0	0	5	20	35	30	90
Residential	0	180	20	0	0	0	200
Total	130	205	260	195	40	30	860

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Iran

Given the uncertain political and economic situation, forecasting energy consumption for Iran is the most difficult analysis of all the OPEC countries. Available economic data indicate output in the nonoil sectors of the economy has declined by about 50 percent since 1979, compared with prerevolution average annual growth of 8 percent. Before the war with Iraq, normal demand for refined products in Iran was about 570,000 b/d, although peak seasonal demand for kerosene and diesel products pushed consumption in some winter months to almost 700,000 b/d. War damage in 1980-81 shut down Abadan, Iran's largest refinery, limiting domestic petroleum supplies and forcing oil consumption to levels of the mid-1970s. Oil use this year is once again approaching consumption levels immediately preceding the war. []

Assuming that Iran enjoys a stable political climate and the government proceeds with a policy of restrained economic growth at an annual average of about 5 percent as the recently announced five-year plan indicates, we expect that oil consumption could increase to as much as 860,000 b/d by 1990. []

Transportation Sector

Official Iranian statistics show that gasoline consumption increased an average of 17 percent annually between 1973 and 1980 as the number of automobiles roughly quadrupled. Motor-diesel use nearly tripled over the same period as the heavy vehicle fleet expanded rapidly; in 1980 Iran had some 200,000 trucks and 48,000 buses. With only about 4,600 km of track in the country, however, rail transport is only a minor consumer of diesel fuel. []

Demand for gasoline and motor-diesel fuel in 1980 was estimated from trade press reporting at around 100,000 b/d and 45,000 b/d, respectively. During the war with Iraq, however, gasoline has been rationed because of damage to refineries. Because the war has virtually closed Iran's major port, Bandar Khomeini, and military and commercial trucks must now haul imports by land from Iran's southern ports, motor transport demand for diesel fuel has probably increased from 1980 levels []

Given constraints by the revolutionary government on the importation of private vehicles, the slower economic expansion, and higher fuel prices, growth rates for oil consumption in the transport sector should be considerably less than those of the late 1970s—probably below 5 percent through 1990. An end to the Iran-Iraq war should allow Tehran to reopen its northern Persian Gulf ports, which should ease the growth in demand for diesel fuel by the trucking industry. []

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Bunker consumption has fallen steadily from a peak of 128,000 b/d in 1973, reflecting the decline in Iranian oil exports and, to a lesser extent, relatively high Iranian fuel prices. Currently, bunker demand is on the order of 15,000 b/d and should rise to about 25,000 b/d by 1985, assuming relatively stable oil exports over the next several years. Commercial air traffic to and from Iran also has fallen considerably since the revolution, with military flights now accounting for most aviation kerosene consumption. We project long-term growth to average about 7 percent annually through 1990, when aviation kerosene demand will be about 25,000 b/d. []

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Electric Power Sector

Iranian statistics show electric utilities to be the largest consumer of refined products in Iran, currently accounting for more than one-third of the country's total oil consumption. Within the electric power sector, liquid-fuel plants account for 70 percent of generating capacity; natural gas, one-fifth; and hydroelectric plants, 10 percent. Oil consumption by power plants apparently has fallen only slightly since the revolution; rising demand for electricity in the residential area has offset economic disruption in the industrial sector. The closing of associated gasfields following the outbreak of the Iran-Iraq war also has required additional liquid fuels for those electric power plants previously fed by gas. []

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Before the revolution, Iran had been planning to double electric capacity by 1982 from the 1978 level of 8,000 megawatts (MW) and triple it by 1987. Most of the expansion was planned in hydroelectricity, nuclear power, and gas-fueled thermal power plants:

- Tehran has since abandoned plans for near-term development of a nuclear industry, although recent meetings between Iranian officials and West European nuclear firms indicate that some work previously started on nuclear power plants may eventually be completed.
- Expansion of hydroelectric facilities has also fallen behind; the Muhammad Reza Shah Dam was commissioned at only one-half its planned capacity of 750 MW.
- Lack of maintenance has caused general deterioration at a number of power plants and in smaller generators.
- Based on its new five-year plan, Tehran hopes to install several new power plants—totaling 8,000 MW in capacity—most of which are planned to be gas fired. []

Despite continued government interest in utilizing gas for electricity generation, the current natural gas supply and distribution system probably will not be able to keep up with the requirements of a rapidly growing electric sector. As a result, we project oil consumption to increase to about 300,000 b/d by 1990. In the future, excess residual fuel oil available as the result of refinery upgrading will make increased use of heavy fuels in the electric power sector more attractive. Strong demand for electricity and the leadtimes required for construction of large thermal plants, however, mean modular, gas-turbine generation will continue to be used as a stopgap, keeping consumption of distillate fuels high over most of the decade. In addition, diesel fuels will power generators in rural electrification and agricultural development programs and for some peak load requirements. []

Residential Sector

Space heaters in the residential and commercial sectors consumed an estimated 120,000 b/d of kerosene in 1980. Despite plans by Tehran to expand the national gas grid into residential areas of major cities, we believe population pressures will outpace the availability of alternative energy supplies. Although growth rates will slow, home kerosene consumption will still grow by 50 percent over the course of the decade, and we project it to reach 180,000 b/d by 1990. Use of distillate fuels in residential heating—currently as high as 30,000 b/d in peak winter months—should double by the end of the decade to an annual rate of about 20,000 b/d. []

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Industrial Sector

We estimate that refinery losses in the oil industry have dropped to about 20,000 b/d, down from an average of 35,000 b/d before the war. The primary cause was the shutdown of the giant refinery at Abadan, which accounted for over half the country's prewar refining capacity. Outside the petroleum sector, industrial use of oil in 1980 was probably less than 10,000 b/d. While development plans call for natural gas to fuel industrial expansion in the latter part of the decade, delays are likely to postpone the substitution of gas for oil, and we project industrial oil demand to rise to about 90,000 b/d by 1990. []

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Iraq

Official statistics and our recent estimates show war-related disruptions in the transportation sector, along with damage to several oil-fired electric plants, have reduced the annual growth of oil demand in Iraq since 1980 to about 6 percent, less than half the rate of the 1970s. Once the war with Iran is over, we expect expansion of the transportation sector to account for about one-half the total growth in oil consumption by 1990. Gas is currently the primary fuel for the electric power sector, although about 100,000 b/d of oil are also burned in power plants. Baghdad intends to convert as many plants as possible to gas, and by 1985 demand for liquid fuels in the sector should begin to level off. Unless continuing hostilities with Iran keep economic growth low or the substitution of gas for oil is delayed, we project Iraqi domestic oil consumption to grow by about 4 to 5 percent annually through the latter part of the decade, reaching 330,000 b/d by 1990.

Transportation Sector

According to OPEC statistics, oil consumption in the transportation sector grew about 14 percent annually between 1973 and 1980, spurred by Baghdad's easing of constraints on automobile imports in 1977. Imports of vehicles averaged about 50,000 units annually through 1980, pushing the total registered vehicle fleet then to around 420,000 vehicles. In the 1980s we project growth in the transportation sector to fall to about half the 1973-80 rate, slowed by the war, lack of foreign exchange for vehicle imports, and increasing engine efficiency. Following an end to hostilities with Iran, increases in air and commercial sea travel could raise total consumption of jet fuel and bunkers to about 20,000 b/d by 1990. By the end of the decade, we expect oil consumption within the transportation sector to be about 125,000 b/d, double 1980 levels.

Electric Power Sector

Gas is the primary energy source for Iraq's electric power sector, fueling over half the country's generating capacity. About one-fourth of the capacity is still oil fired, however, and utilities accounted for about 95,000 b/d of petroleum products in 1980, 45 percent of total Iraqi oil consumption. If plans to increase gas use in the electric power sector are met, demand for liquid fuels should begin to level off after 1985.

Industrial Sector

We expect that oil industry use of about 14,000 b/d in 1980 will double by 1990 if current refinery expansion plans are carried out. Oil consumption in other industries—primarily naptha used as a petrochemical feedstock—should grow to about 45,000 b/d by 1990, roughly twice current demand levels.

Residential Sector

Iraqi officials indicate that liquefied petroleum gas (LPG) and electricity are increasingly displacing kerosene in the residential sector. As a result, we project residential kerosene consumption to stabilize at about 15,000 b/d through the remainder of the decade.

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Iraq
Domestic Oil Consumption, by Fuel Type

Thousand b/d

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	11.3	11.7	14.5	17.4	19.2	22.2	26.7	28.7	30.7	32.9	35.0	40.0	55.0
Kerosene	16.1	19.4	21.3	23.0	23.8	25.0	25.8	27.7	29.7	31.9	34.0	35.0	35.0
Distillate	14.3	15.7	22.1	29.0	34.9	38.9	45.6	48.8	52.2	55.8	60.0	65.0	90.0
Residual	32.2	34.3	34.6	39.3	44.8	52.6	58.2	65.0	69.5	73.8	79.0	90.0	95.0
Other	3.5	3.9	5.5	6.7	8.0	10.8	14.9	21.0	22.5	24.1	24.0	25.0	25.0
Bunkers	0.0	0.0	0.0	0.0	0.0	2.3	2.0	2.0	0.0	0.0	0.0	0.0	5.0
Losses	3.0	5.5	5.6	5.8	7.1	10.6	12.0	14.0	7.0	10.0	14.0	20.0	25.0
Total	80.4	90.5	103.6	121.2	137.8	162.4	185.2	207.2	211.6	228.5	246.0	275.0	330.0

^a Estimated.

^b Projected.

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Iraq
Sectoral Oil Demand, by Fuel Type and Year

Thousand b/d

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	29	7	25	2	0	0	63
Electric	0	10	24	60	0	0	94
Industrial	0	0	0	5	21	14	40
Residential	0	10	0	0	0	0	10
Total	29	27	49	67	21	14	207
1985							
Transport	40	10	35	5	0	0	90
Electric	0	10	30	75	0	0	115
Industrial	0	0	0	10	25	20	55
Residential	0	15	0	0	0	0	15
Total	40	35	65	90	25	20	275
1990							
Transport	55	15	50	5	0	0	125
Electric	0	5	30	80	0	0	115
Industrial	0	0	10	15	25	25	75
Residential	0	15	0	0	0	0	15
Total	55	35	90	100	25	25	330

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Kuwait

Kuwait's domestic oil consumption is currently nearly 160,000 b/d, but an estimated 45,000 b/d of this represents additional demand for oil due to the transshipment of supplies to Iraq by truck and use in the generation of electric power because of natural gas shortages. Assuming a settlement of the Iran-Iraq war and increased gas availability, we project that domestic oil consumption could actually decline to about 155,000 b/d by 1985. By 1990, however, consumption is expected to be about 185,000 b/d.

Transportation Sector

We estimated that the consumption of motor-diesel fuel has increased by 20,000 b/d since 1980, in large measure because Kuwait has become a major transshipment center for the movement of supplies to southern Iraq. If a settlement is reached between Iran and Iraq that allows Baghdad some use of its southern ports, we would expect motor-diesel use in Kuwait to fall to about 25,000 b/d by 1985. Due to a dramatic falloff in oil exports, a drop in demand for bunkers—currently estimated at about 15,000 b/d—has reduced the transportation sector's share of domestic oil consumption to about 45 percent this year from its 65-percent share in 1980. If oil output stabilizes at around 1.5 million b/d in the late 1980s, we estimate bunker consumption will rise to about 35,000 b/d.

Electric Power Sector

Current low levels of Kuwaiti crude oil production have restricted associated natural gas supplies for the electric power industry. If crude production increases above 1.25 million b/d by 1985, oil consumption in the electric power sector should drop to about 25,000 b/d. Kuwait is drilling for nonassociated gas to boost supplies, but to date has had little success. Without nonassociated gas, we project oil consumption by electric power plants will remain at about the 25,000-b/d level through 1990, with residual fuel oil gradually replacing distillate in smaller, isolated generating stations.

Industrial Sector

Petrochemical manufacturing and oil production and processing account for about 25,000 b/d of oil consumption. We estimate that expansion of refineries and rising crude oil throughput will increase overall industry use to about 40,000 b/d during the last half of the decade. Most of the smaller industries included in Kuwait's development plan are to use natural gas for power and feedstock.

Residential Sector

Consumption of kerosene, used for home cooking and lighting, is currently estimated at 3,000 to 4,000 b/d. As Kuwait continues to urbanize, LPG and electric power will increasingly displace kerosene, making oil use in the residential sector almost negligible by 1990.

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Kuwait
Domestic Oil Consumption, by Fuel Type

Thousand b/d

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	8.8	9.7	11.0	12.1	14.2	16.8	18.7	20.7	22.6	24.0	25.0	25.0	40.0
Kerosene	3.0	4.0	4.8	5.9	6.1	7.2	8.9	7.9	8.7	9.5	9.0	10.0	10.0
Distillate	3.2	3.5	4.1	5.2	6.2	9.0	8.1	10.0	20.2	29.8	35.0	30.0	35.0
Residual	0.8	0.9	1.9	4.4	2.4	0.7	1.6	0.0	0.0	0.0	0.0	0.0	5.0
Other	1.1	1.3	2.6	2.6	2.6	3.2	4.0	15.4 ^c	33.0	46.5	55.0	35.0	30.0
Bunkers	90.1	63.1	41.4	44.7	49.7	45.2	56.0	35.6	25.6	18.1	15.0	25.0	35.0
Losses	8.1	7.3	28.0	27.1	21.5	28.0	28.0	20.0	17.0	25.0	30.0	30.0	30.0
Total	115.1	89.8	93.8	102.0	102.7	110.1	125.3	109.6	127.1	152.9	169.0	155.0	185.0

^a Estimated.^b Projected.^c From 1980 includes crude oil to Doha Power Station.

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Kuwait
Sectoral Oil Demand, by Fuel Type and Year

Thousand b/d

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	21	4	10	36	0	0	71
Electric	0	0	0	0	10	0	10
Industrial	0	0	0	0	5	20	25
Residential	0	4	0	0	0	0	4
Total	21	8	10	36	15	20	110
1985							
Transport	25	5	25	25	0	0	80
Electric	0	0	5	0	25	0	30
Industrial	0	0	0	0	10	30	40
Residential	0	5	0	0	0	0	5
Total	25	10	30	25	35	30	155
1990							
Transport	40	5	35	35	0	0	115
Electric	0	0	0	5	20	0	25
Industrial	0	0	0	0	10	30	40
Residential	0	5	0	0	0	0	5
Total	40	10	35	40	30	30	185

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Libya

Based on 1981 Libyan data, we estimate that petroleum product consumption in Libya is currently close to 120,000 b/d, having increased at an average annual rate of 14 percent since 1973. OPEC statistics show the rate of growth in oil demand in recent years has dropped in half, however, and even assuming some improvement, petroleum consumption is unlikely to grow at above 6 to 7 percent annually through the remainder of the 1980s. Increased use of natural gas in electric power and industrial plants should keep oil consumption increases relatively low, although demand will still grow to about 180,000 b/d by 1990.

[REDACTED]

Transportation Sector

The transportation sector has registered the largest increase in fuel consumption. Gasoline use, although slowing in recent years, increased at an annual rate of 14 percent between 1973 and 1982. We estimate current gasoline consumption to be around 24,000 b/d. Diesel fuel use by commercial trucks and military vehicles accounts for a small, but growing, share of the transport sector. Nationalization of the private trucking industry, however, and promulgation of restrictive real estate laws dampening construction activity have been instrumental in slowing the growth in demand for motor-diesel fuel in recent years. Our estimates place jet fuel consumption at no more than 5,000 b/d, with most going to the military. Bunker fuel consumption by oil tankers and other commercial shipping is minimal.

[REDACTED]

Electric Power Sector

The electric power sector is the largest consumer of petroleum products, currently accounting for 50,000 to 55,000 b/d. Tripoli has announced plans to raise its generating capacity to over 3,500 MW by 1990. Residual fuel oils are to be substituted for diesel oil, which currently accounts for around 60 percent of the liquid fuel used in this sector. Natural gas is also becoming more important in power generation, and we estimate it will supply up to one-third of the energy requirements in the sector by 1990.

[REDACTED]

Industrial Sector

The petroleum industry currently accounts for about half of the 12,000 b/d in industrial oil demand, with the remainder going into petrochemical and asphalt production. We expect refinery losses to grow to 10,000 b/d as a new refinery at Ras Lanuf is completed in the mid-1980s and throughput at the Zawia refinery increases. Oil consumption in the remainder of the industrial sector will slow as plants convert to natural gas.

[REDACTED]

Residential Sector

OPEC statistics show residential kerosene consumption has remained stable at about 5,000 to 6,000 b/d since 1975. Used primarily for lighting and cooking, it is being displaced by bottled gas and electricity, and demand is likely to remain flat through the remainder of the decade.

[REDACTED]

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Libya

Domestic Oil Consumption, by Fuel Type

Thousand b/d

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	7.1	8.7	10.5	11.8	13.4	15.6	17.4	19.0	20.6	22.3	24.0	25.0	35.0
Kerosene	4.3	4.7	5.8	6.1	6.0	6.3	8.3	9.9	9.6	10.3	11.0	10.0	15.0
Distillate	11.5	15.6	21.2	22.9	24.4	26.5	30.0	31.6	35.2	38.0	41.0	45.0	50.0
Residual	3.2	3.9	7.8	8.8	12.0	14.5	17.6	21.5	22.9	25.6	28.0	35.0	55.0
Other	5.6	3.4	4.9	3.7	6.2	5.8	7.0	3.4	5.4	5.5	6.0	5.0	10.0
Bunkers	1.0	1.0	1.0	1.0	1.0	1.1	2.0	3.0	2.5	2.0	2.0	5.0	5.0
Losses	0.1	0.1	0.2	1.9	3.6	4.5	5.0	5.0	5.0	6.0	6.0	10.0	10.0
Total	32.8	37.4	51.4	56.2	66.6	74.3	87.3	93.4	101.2	109.7	118.0	135.0	180.0

^a Estimated.

^b Projected.

Libya

Sectoral Oil Demand, by Fuel Type and Year

Thousand b/d

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	19	4	7	3	0	0	33
Electric	0	0	25	17	0	0	42
Industrial	0	0	0	4	3	5	12
Residential	0	6	0	0	0	0	6
Total	19	10	32	24	3	5	93
1985							
Transport	25	5	10	5	0	0	45
Electric	0	0	35	30	0	0	65
Industrial	0	0	0	5	5	10	20
Residential	0	5	0	0	0	0	5
Total	25	10	45	40	5	10	135
1990							
Transport	35	10	15	5	0	0	65
Electric	0	0	35	45	0	0	80
Industrial	0	0	0	10	10	10	30
Residential	0	5	0	0	0	0	5
Total	35	15	50	60	10	10	180

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Nigeria

We project growth in Nigerian oil consumption will slow considerably from last decade's annual rate of almost 20 percent, primarily because of slower growth in demand in the transportation sector, which currently accounts for over one-half of total oil consumption of 215,000 b/d. Limited road and rail capacity, port constraints, and rising domestic fuel prices should hold annual growth rates in the sector to under 7 percent through 1990. Hydroelectric plants will continue to provide more than two-thirds of the total electricity generated, and kerosene and electricity are only gradually replacing noncommercial fuels in the residential sector. []

Transportation Sector

From official Nigerian statistics and OPEC data, we estimate that transportation demand accounts for about 55 percent of current oil consumption. Growth in gasoline use should average 5 percent through 1985 and then slow gradually as increasing fuel prices and limited road capacity hold down increases in traffic mileage. While the conversion of Nigeria's railroads to diesel engines accounted for a major part in increasing distillate fuel consumption between 1973 and 1980, future rail expansion will probably be modest. Indeed, an inadequate transportation system may be a significant impediment to Nigeria's economic growth over the decade and affect oil consumption in other sectors as well. []

Electric Power Sector

We estimate that electricity generation accounts for less than 20 percent of total petroleum product consumption and may drop to only 15 percent by 1990. Hydroelectric generating plants currently provide about two-thirds of total electricity production in Nigeria, and several new hydroelectric plants are planned to come on stream before 1990. Periodic, severe droughts make heavy dependence on hydro-power risky, however, and we believe Lagos will maintain a sizable thermal power plant capacity for the foreseeable future. Although government development plans call for replacing oil with gas, or possibly coal, oil-fired generation is likely to account for at least 25 percent of generating capacity in 1990. []

Nigeria's large, albeit low-quality, coal reserves have been neglected in recent years, and current coal production is inadequate to meet domestic demand. Previous press reporting indicates that Lagos has at least considered constructing several coal-fired generating plants to supply power to the national electricity grid, but we believe such projects are unlikely to be undertaken in coming years because of limited coal production and transportation constraints. []

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Residential Sector

Residential demand for oil products, primarily kerosene, currently accounts for 16 percent of total oil product consumption—30,000 b/d—and is likely to grow to about 45,000 b/d by 1990. Firewood and charcoal, the primary residential energy sources for 70 percent of the Nigerian population, are only gradually being replaced by kerosene and electricity as wood becomes scarce and charcoal more expensive. []

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Industrial Sector

Industrial demand accounts for only 12 percent of total consumption. Although we expect industrial oil demand to double to about 40,000 b/d between 1980 and 1990, industry's share of total domestic consumption will remain fairly constant as natural gas becomes a major energy source for the industrial and petrochemical sectors. Nigeria plans to utilize part of its vast gas potential in fertilizer plants, petrochemical projects, and several new steel mills under construction. []

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Nigeria
Domestic Oil Consumption, by Fuel Type

Thousand b/d

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	16.7	20.6	27.5	38.4	43.5	48.0	56.9	69.8	86.1	90.4	95.0	105.0	140.0
Kerosene	7.8	8.7	13.1	14.9	17.2	18.1	21.5	34.2	36.0	37.0	39.0	45.0	55.0
Distillate	12.1	13.0	14.8	19.7	28.6	31.9	33.6	40.7	46.0	47.0	49.0	55.0	70.0
Residual	7.4	7.4	8.1	11.4	9.7	11.8	12.0	14.7	16.2	16.8	17.0	20.0	25.0
Other	4.9	4.4	4.6	5.0	12.9	24.2	30.3	11.6	12.4	12.9	13.0	15.0	20.0
Bunkers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.9	1.0	0.0	0.0
Losses	2.6	2.2	0.7	1.3	1.4	1.8	2.0	2.6	3.0	3.1	3.0	5.0	5.0
Total	51.5	56.3	68.8	90.7	113.3	135.8	156.3	173.6	200.1	208.1	217.0	245.0	315.0

^a Estimated.

^b Projected.

Nigeria
Sectoral Oil Demand, by Fuel Type and Year

Thousand b/d

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	70	5	21	0	0	0	96
Electric	0	0	20	10	0	0	30
Industrial	0	0	0	5	11	3	19
Residential	0	29	0	0	0	0	29
Total	70	34	41	15	11	3	174
1985							
Transport	105	5	25	0	0	0	135
Electric	0	0	25	15	0	0	40
Industrial	0	0	5	5	15	5	30
Residential	0	40	0	0	0	0	40
Total	105	45	55	20	15	5	245
1990							
Transport	140	10	30	0	0	0	180
Electric	0	0	30	20	0	0	50
Industrial	0	0	10	5	20	5	40
Residential	0	45	0	0	0	0	45
Total	140	55	70	25	20	5	315

Confidential**Qatar**

Approximately two-thirds of domestic oil consumption in Qatar is accounted for by the transportation sector, and we project it to remain above 60 percent through 1990, when total oil demand in Qatar will exceed 20,000 b/d. Most of the energy needs in other sectors of the economy are already met by natural gas, with the exception of the residential sector, which uses mostly bottled gas and electricity. We estimate that the only significant growth in oil use outside the transportation sector will be in the petroleum industry, due primarily to refinery losses at the 50,000-b/d Um Said export refinery to be completed this year.

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Qatar

Thousand b/d

Domestic Oil Consumption, by Fuel Type

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	1.3	1.4	1.6	2.0	2.6	2.9	3.4	3.9	4.4	5.1	5.0	6.0	7.0
Kerosene	0.6	0.8	1.2	1.6	1.6	1.7	1.6	1.6	1.5	1.5	2.0	3.0	4.0
Distillate	0.8	1.0	1.4	2.1	2.8	2.8	3.0	3.2	3.7	4.1	4.0	5.0	6.0
Residual	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.0	1.0
Bunkers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	1.0
Losses	0.1	0.1	0.3	0.1	1.0	0.4	0.4	0.4	0.3	0.5	0.5	2.0	3.0
Total	2.8	3.3	4.5	5.8	8.1	8.0	8.7	9.4	10.6	11.9	12.0	16.0	22.0

^a Estimated.^b Projected.

Qatar

Thousand b/d

Sectoral Oil Demand, by Fuel Type and Year

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	4	0	2	0	0	0	6
Electric	0	0	1	0	0	0	1
Industrial	0	0	0	0	0	0	0
Residential	0	2	0	0	0	0	2
Total	4	2	3	0	0	0	9
1985							
Transport	6	1	3	0	0	0	10
Electric	0	0	2	0	0	0	2
Industrial	0	0	0	0	0	2	2
Residential	0	2	0	0	0	0	2
Total	6	3	5	0	0	2	16
1990							
Transport	7	2	4	1	0	0	14
Electric	0	0	2	0	0	0	2
Industrial	0	0	0	0	1	3	4
Residential	0	2	0	0	0	0	2
Total	7	4	6	1	1	3	22

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Saudi Arabia

We estimate that Saudi domestic oil consumption, excluding bunkers, doubled between 1977 and 1980. Growth should slow considerably in the years ahead as a continuing weak oil market affects overall economic activity within the country. We project total oil consumption to increase from an estimated 775,000 b/d in 1982 to 1.1 million b/d by 1990, an annual growth rate of less than 5 percent, almost half that of the 1973-82 period. []

Official Saudi statistics show that the most dramatic consumption increases have come in the use of middle distillate and residual fuel oils to power electric and saltwater desalination plants. Consumption more than doubled to about 430,000 b/d between 1979 and 1982. Demand could grow by another 60,000 b/d this year, as natural gas shortages increasingly force consumers to switch back to liquid fuels. Expected low oil production levels will keep associated gas volumes low until at least late next year, when additional gas supplies are developed. []

We foresee the real possibility of domestic oil price hikes in the near future, which should moderate demand for most petroleum products, particularly for gasoline. A generally sluggish economy should also slow growth in the vehicle fleet and reduce burgeoning demand for oil in the construction industry. We expect demand for marine bunkers, which has declined significantly since 1974, to bottom out this year at about 55,000 b/d and climb back to about 110,000 b/d by 1990. []

Transportation Sector

We project gasoline consumption, which rose at an annual rate of 25 percent from 1973 through 1982, to drop to about one-fourth this rate for the remainder of the decade. Lower growth in the economy and in per capita income will slow motor vehicle imports into Saudi Arabia, and increased auto efficiency should offset rising vehicle mileage, contributing to slower growth in domestic gasoline demand. Demand for diesel fuel should grow at approximately the same rate as gasoline in coming years, rising from 42,000 b/d in 1980 to about 80,000 b/d by 1990. []

Countering the trend of other fuels, we foresee the rate of aviation kerosene consumption increasing roughly 9 percent annually through 1990. The construction of a network of regional airports, along with large international complexes at Jidda and Riyadh, will keep the growth rate of domestic air traffic high throughout the decade. []

Saudi statistics show that consumption of marine bunkers has dropped dramatically in the past two years. The threefold increase in bunker prices in 1979-80 forced shippers to use larger and more efficient tankers and slower steaming to conserve fuel. Inclusion of mandatory bunker purchases in crude oil contracts by other Persian Gulf producers—notably Iran and Kuwait—also contributed to lower Saudi bunker use. In the late 1970s almost one-fourth of Saudi bunker sales were to ships lifting crude at ports outside of Saudi Arabia. Bunker demand will be unusually low this year because of reduced levels of Saudi oil exports but should rebound to about 70,000 b/d over the next few years and grow to about 110,000 b/d by 1990. []

Electric Power Sector

Since 1976 electric power consumption has increased at an average annual rate of over 30 percent as electric grids were extended to large sections of the country. Official statistics show about four-fifths of the population are now included in the electrification program, and, with most of the planned 10,000 MW of generating capacity installed, the large jumps in electricity demand seen in recent years are probably over. Natural gas is to fuel most power plants in the eastern region, where the majority of the country's generating capacity is located. Because of low levels of crude oil production expected to last through 1985, associated gas will be in short supply and liquid fuels—predominately distillates—are to be substituted until additional gas resources become available late next year. This will cause a sharp rise in oil demand in the electric power sector between now and 1985, but oil consumption in the sector, excluding that used for desalination, should level off at about 250,000 to

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Saudi Arabia

Thousand b/d

Domestic Oil Consumption, by Fuel Type

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	16.3	19.9	26.6	35.3	45.6	57.7	66.5	87.1	102.4	120.4	131.0	155.0	190.0
Kerosene	9.9	13.2	16.1	19.1	24.5	26.9	30.8	33.0	37.0	40.4	44.0	50.0	70.0
Distillate	26.3	18.5	19.0	31.1	49.4	87.5	98.7	97.6	156.2	193.7	250.0	270.0	330.0
Residual	8.7	22.7	36.1	45.2	47.5	67.3	88.9	162.3	201.6	236.6	239.0	240.0	295.0
Other ^c	7.0	13.5	19.5	26.4	34.9	40.8	43.0	77.5	62.3	71.0	79.0	95.0	70.0
Bunkers	251.9	255.4	149.5	172.2	174.8	131.1	126.0	101.2	69.0	69.8	56.0	75.0	110.0
Losses	15.5	19.2	18.8	24.9	25.0	28.0	30.0	35.0	39.5	43.0	45.0	50.0	60.0
Total	335.6	362.4	285.6	354.2	401.7	439.3	483.9	593.7	668.0	774.9	844.0	935.0	1,125.0

^a Estimated.

^b Projected.

^c Includes crude oil.

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Saudi Arabia

Thousand b/d

Sectoral Oil Demand, by Fuel Type and Year

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	87	28	42	101	3	0	261
Electric	0	0	48	113	51	0	212
Desalination	0	0	0	71	0	0	71
Industrial	0	0	8	49	24	35	116
Residential	0	5	0	0	0	0	5
Total	87	33	98	263	78	35	594
1985							
Transport	155	45	65	75	5	0	345
Electric	0	0	185	195	60	0	440
Desalination	0	0	40	115	25	0	180
Industrial	0	0	20	45	30	50	145
Residential	0	5	0	0	0	0	5
Total	155	50	270	315	95	50	935
1990							
Transport	190	65	80	110	5	0	450
Electric	0	0	220	265	25	0	510
Desalination	0	0	70	190	0	0	260
Industrial	0	0	30	30	40	60	160
Residential	0	5	0	0	0	0	5
Total	190	70	330	405	70	60	1,125

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260,000 b/d after that as gas supplies expand. By 1990 liquid fuels, including some raw crude oil, will essentially be used only in the western provinces and at smaller, remote locations within the kingdom. [redacted]

Desalination Sector

Unlike a number of the smaller Persian Gulf countries in which water desalination is a component of the electric power sector, Saudi Arabia's desalination plants are major independent consumers of liquid hydrocarbons. We expect the desalination facilities to increase their use of oil from 70,000 b/d in 1980 to at least 260,000 b/d by 1990. Currently, six major plants are under construction in the western provinces, which will enlarge water production capacity by 6 million b/d; another 20 plants are planned, which could double this rate by 1990. Almost all of these plants will be oil fired. [redacted]

Desalination plants in the eastern provinces are to be fueled by natural gas, with backup systems capable of burning both distillate and heavy fuel oil. Because of the current gas shortfall, liquid fuels—primarily distillates—are being substituted, and we project oil consumption in the desalination sector to rise at an annual rate close to 20 percent between 1980 and 1985. Growth should then fall off to less than 10 percent in the latter half of the decade, reflecting completion of most large plants and increasing availability of natural gas for desalination plants on the Persian Gulf. [redacted]

Residential/Commercial Sector

Electricity and bottled gas (LPG) are displacing kerosene in the residential and commercial sectors for space heating and cooking. Although LPG consumption, currently around 6,000 b/d, is constrained by distribution facilities, we expect it to double by 1985 and triple by 1990. Residential kerosene demand peaked in 1976 and is likely to remain around 5,000 b/d. [redacted]

Industrial Sector

Our analysis indicates that total industrial use of oil products in 1980 was about 115,000 b/d and will increase to 160,000 b/d by 1990. The petroleum sector consumed about 60,000 b/d in 1980, over half of which were accounted for by losses in the refinery process. Current industrial demand for oil is probably

close to the 1980 figure of 115,000 b/d. Lower levels of oil production have reduced the petroleum industry's share, offsetting growth in other areas of the industrial sector, although increasing substitution of liquid fuels for natural gas in the short term will push oil consumption in industry up to about 145,000 b/d by 1985. After that gas should once again replace oil in the eastern industrial areas. Saudi plans to double refinery capacity will increase the petroleum industry's consumption to 80,000 b/d by 1990, while demand in the construction sector will level off at about 35,000 to 40,000 b/d between now and 1990. Nonenergy use of oil products, such as asphalt, lubricants, and petrochemicals, is currently about 25,000 b/d and is expected to increase to about 40,000 b/d. [redacted]

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United Arab Emirates
Domestic Oil Consumption, by Fuel Type
Thousand b/d

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	1.4	1.9	5.2	6.0	8.7	10.2	9.2	13.6	17.9	18.3	20.0	25.0	35.0
Kerosene	0.7	1.3	4.3	5.0	7.0	7.3	8.0	11.5	16.2	16.2	17.0	20.0	20.0
Distillate	2.5	3.3	15.1	18.7	28.4	31.9	30.0	31.6	41.5	42.5	46.0	50.0	60.0
Residual	0.1	0.1	0.1	1.0	3.0	3.6	7.0	19.2	20.9	24.3	26.0	25.0	30.0
Other	0.1	0.5	0.9	0.7	0.0	0.0	0.0	0.3	0.3	0.5	1.0	0.0	0.0
Bunkers	0.0	0.0	0.0	0.0	0.0	1.9	3.1	3.7	3.5	3.0	3.0	5.0	5.0
Losses	0.0	0.0	0.0	0.3	0.8	1.0	1.0	2.0	2.0	5.0	5.0	5.0	5.0
Total	4.8	7.1	25.6	31.7	47.9	55.9	58.3	81.9	102.3	109.8	118.0	130.0	155.0

^a Estimated.^b Projected.

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United Arab Emirates
Sectoral Oil Demand, by Fuel Type and Year
Thousand b/d

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	14	3	10	4	0	0	31
Electric	0	0	20	19	0	0	39
Industrial	0	0	2	0	0	2	4
Residential	0	8	0	0	0	0	8
Total	14	11	32	23	0	2	82
1985							
Transport	25	5	20	5	0	0	55
Electric	0	0	25	25	0	0	50
Industrial	0	0	5	0	0	5	10
Residential	0	15	0	0	0	0	15
Total	25	20	50	30	0	5	130
1990							
Transport	35	5	30	5	0	0	75
Electric	0	0	20	30	0	0	50
Industrial	0	0	10	0	0	5	15
Residential	0	15	0	0	0	0	15
Total	35	20	60	35	0	5	155

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United Arab Emirates

According to official statistics, petroleum consumption in the United Arab Emirates, currently estimated at almost 120,000 b/d, grew at an average annual rate of over 40 percent in the period 1973-82. In recent years the growth rate has dropped sharply, reflecting a slower pace of development because of declining oil revenues and the completion of many infrastructural projects. In addition, Emirate officials expect future energy needs to be met largely by natural gas or natural gas liquids (NGL), particularly in the northern Emirates, which have had a series of significant gas condensate finds over the past year. As a result, we project domestic oil consumption within the UAE to grow by only about 35,000 b/d between now and 1990. []

Transportation Sector

We estimate oil demand in the transportation sector currently is about 45,000 b/d, and this should grow at about 7 to 8 percent annually through 1990. Despite a current economic slowdown, the UAE still has one of the highest per capita incomes in the world; and, with the added impact of revenue from the new oil finds in the north, increasing personal and commercial travel should push oil demand in this sector to 75,000 b/d by 1990. []

Electric Power Sector

Electricity generation currently consumes over 45,000 b/d of oil products and is almost evenly divided between diesel and residual fuel oils. Our projections show demand for oil growing slowly through 1985, when 50,000 b/d will be consumed in the electric power sector. In the latter half of the decade, however, consumption should level off as natural gas and NGLs are substituted for oil in northern power plants. We also expect a shift away from distillate fuels in favor of residual fuel oil. The latter is projected to comprise 60 percent of the sector's oil consumption by 1990. []

Industrial Sector

Industrial oil demand is not a significant factor in overall oil consumption within the Emirates, and even by 1990 we estimate it will still comprise less than 10 percent of total demand. According to trade publications, most of the new industrial projects coming on line later in the decade are slated to use natural gas or gas condensates for fuel. []

Residential Sector

Residential demand for oil products, primarily kerosene, is currently about 10,000 b/d, and we expect it to grow to 15,000 b/d by 1990. While electricity and bottled gas supply most residential needs in urban areas, we believe the growing population and a strong nomadic tradition within the Emirates will underpin small increases in demand for kerosene through the end of the decade. []

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Confidential**Venezuela***Thousand b/d***Domestic Oil Consumption, by Fuel Type**

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ^a	1983 ^b	1985 ^b	1990 ^b
Gasoline	87.4	94.7	105.3	117.1	131.4	143.1	152.6	158.5	163.4	168.1	165.0	175.0	205.0
Kerosene	11.5	11.6	11.9	12.9	13.6	13.7	14.6	13.9	13.5	14.4	15.0	15.0	20.0
Distillate	35.3	38.9	41.5	45.6	45.5	58.1	65.8	76.5	80.4	83.2	85.0	100.0	125.0
Residual	25.9	21.8	23.0	22.3	17.6	23.7	36.5	54.8	61.4	62.2	65.0	70.0	85.0
Other	36.9	30.2	28.1	36.9	38.1	37.4	33.8	44.7	43.2	52.1	57.0	60.0	70.0
Bunkers	48.8	44.1	25.3	24.8	24.4	23.1	27.2	18.7	19.3	17.4	18.0	20.0	25.0
Losses	25.5	30.1	24.0	19.5	19.4	22.7	20.0	25.7	26.7	27.8	28.0	30.0	40.0
Total	271.3	271.4	259.1	279.1	290.0	321.8	350.5	392.8	407.9	425.2	433.0	470.0	570.0

^a Estimated.^b Projected.

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Venezuela*Thousand b/d***Sectoral Oil Demand, by Fuel Type and Year**

	Gasoline	Kerosene	Distillate	Residual	Other	Losses	Total
1980							
Transport	159	10	44	11	2	0	226
Electric	0	9	26	37	0	0	63
Industrial	0	0	6	25	43	26	100
Residential	0	4	0	0	0	0	4
Total	159	14	76	73	45	26	393
1985							
Transport	175	10	60	20	5	0	270
Electric	0	0	30	50	0	0	80
Industrial	0	0	10	20	55	30	115
Residential	0	5	0	0	0	0	5
Total	175	15	100	90	60	30	470
1990							
Transport	205	15	75	25	5	0	325
Electric	0	0	35	55	0	0	90
Industrial	0	0	15	30	65	40	150
Residential	0	5	0	0	0	0	5
Total	205	20	125	110	70	40	570

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Venezuela

Domestic oil consumption, currently about 435,000 b/d, will grow by approximately 4 percent annually to about 570,000 b/d in 1990, slightly less than the 1973-80 period. We estimate that the transportation sector will account for over 50 percent of the total growth in consumption through 1990. Current plans by Caracas to expand electric generation capacity will rely primarily on hydropower, natural gas, and coal as energy sources. []

industries, particularly steel and aluminum, and the construction of metal-processing plants will be supported primarily by hydroelectric and natural gas supplies and from developing coal reserves in the northwest section of the country. The majority of the 50,000-b/d consumption growth we project in the industrial sector this decade is accounted for by increased petrochemical use of naphtha and larger refinery losses. []

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Transportation Sector

According to Embassy reporting, the government's 120-percent increase in the domestic price for gasoline last year—moving from a weighted average of 20 cents to 44 cents per gallon—combined with continuing stagnation in the Venezuelan economy, has significantly affected gasoline consumption, which we expect may actually drop somewhat this year. Nonprice measures to curb gasoline use, such as lower speed limits, restrictions of automobile use in the Caracas area, Sunday closings of service stations in urban areas, and a move to smaller engines will also lower future gasoline demand. Furthermore, coming austerity moves will almost certainly entail additional sharp price hikes in 1984, following this year's presidential election. We project gasoline demand to grow at about 3 percent per year through 1990, less than half the rate forecast by the government in 1980. If these measures are successful, gasoline's share of domestic demand, currently roughly 40 percent, may actually drop several percentage points by the end of the decade. []

Recent cancellation of development projects within the Orinoco heavy oil belt will significantly reduce oil demand in this geographic region, which industry sources once forecast to reach almost 75,000 b/d by 1990. The projects requiring large amounts of energy to extract and convert heavy, viscous crude to a usable oil have largely been scrapped, and the only one to proceed uses conventional methods for the recovery of oil. We expect, therefore, that additional oil demand in the Orinoco region should not exceed 10,000 b/d by 1990. []

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Electric Power Sector

According to government statistics, electric utilities consume approximately 75,000 b/d of oil products in Venezuela, and we project demand to grow to about 90,000 b/d by 1990. Residual fuel use doubled between 1978 and 1980 to about 37,000 b/d with the startup of a new oil-fired power plant, but should slow to a 4-percent growth rate for the remainder of the decade. We estimate distillate fuel used in diesel generators and gas turbines currently to be less than 30,000 b/d, growing only marginally to about 35,000 b/d by 1990. []

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Official statistics show diesel fuel now comprises one-fifth of total domestic consumption, and transportation accounts for almost 60 percent of diesel use.

Expansion and modernization of the rail system using more diesel engines, increased truck travel from industries located in remote regions of the country, and some growth in the construction industry contribute to our projection of a 5-percent annual increase in diesel demand through 1990. Still, this is a slowdown from the 11-percent annual rate of the previous decade. []

Residential Sector

Residential demand for kerosene is at most about 5,000 b/d. We expect increased use of bottled gas and electricity to offset growth in demand for cooking fuels, and Venezuela's mild climate keeps space heating needs to a minimum. []

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Industrial Sector

Industrial consumption of oil is about 100,000 b/d, mostly in the petroleum and petrochemical sectors.

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